The Space Shuttle's Second Decade:

America's Best Gets Better

From Maturity Comes Efficiency

In its second decade of flight, the Space Shuttle Program has saved taxpayers billions of dollars, giving them more for less by turning experience and maturity into efficiency. Since 1991, shuttle costs have been cut almost in half, while its safety, capability and success have dramatically increased. The shuttle has flown its most complex missions in the past decade, including flights to support two space stations; repair and enhance the Hubble Space Telescope; study the Sun and map the Earth; and study animals, plants, materials and human beings in weightlessness. The shuttle today remains a preeminent symbol of United States ingenuity and achievement, unmatched in the world.

National Aeronautics and
Space Administration

Safer Flights, Less Cost

Almost 65 percent of all shuttle flights have been launched in the past 10 years. In tandem, the Space Shuttle has reduced costs over 40 percent. At the same time, the safety of the shuttle has increased. Estimated risks during launch have been reduced by 80 percent. Overall, the number of shuttle problems in flight has dropped 70 percent. The safety of the shuttle team nationwide carries equal priority, with the shuttle workplace far safer than the industry average and continuing to improve.

Shuttle Cost Management

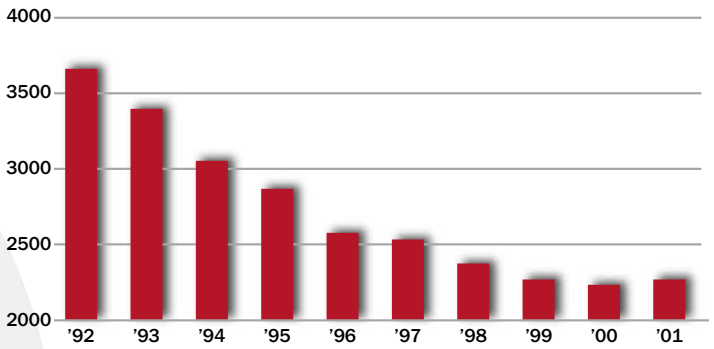
While cutting costs, the Space Shuttle Program has produced:

- **Safer missions**
- **More complex flights**
- **Safer workplace**
- **Increased capabilities**
- **Fewer problems**
- **More success**

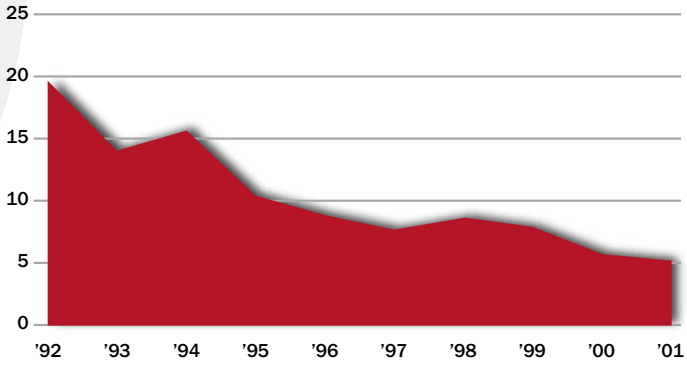
Today's shuttle: 2.5 million parts. Less than five problems per flight.

Shuttle Costs Down 40 Percent

FY92$ Cost in Millions

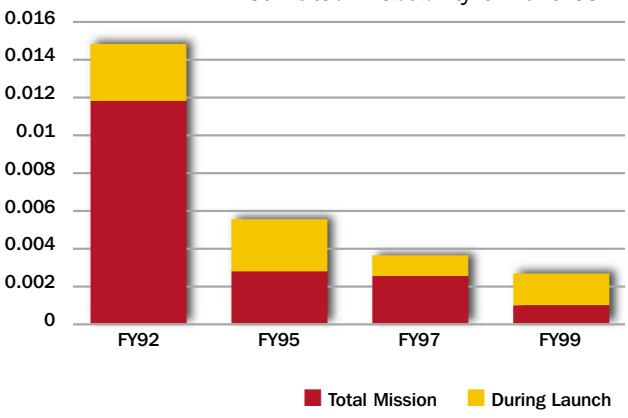


In-flight Problems Down 70 Percent



Launch Risks Down 80 Percent Mission Risks Down 75 Percent

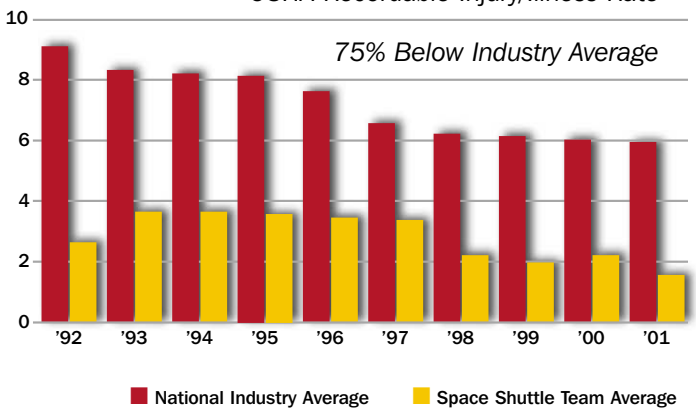
Estimated Probability of Failures



Workforce Accidents Down 26 Percent

OSHA Recordable Injury/Illness Rate

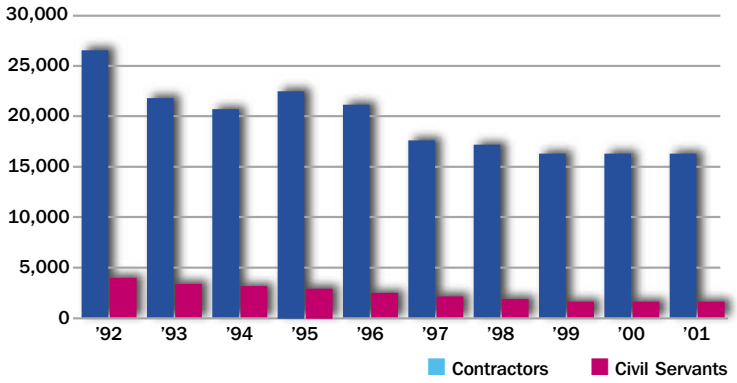
75% Below Industry Average

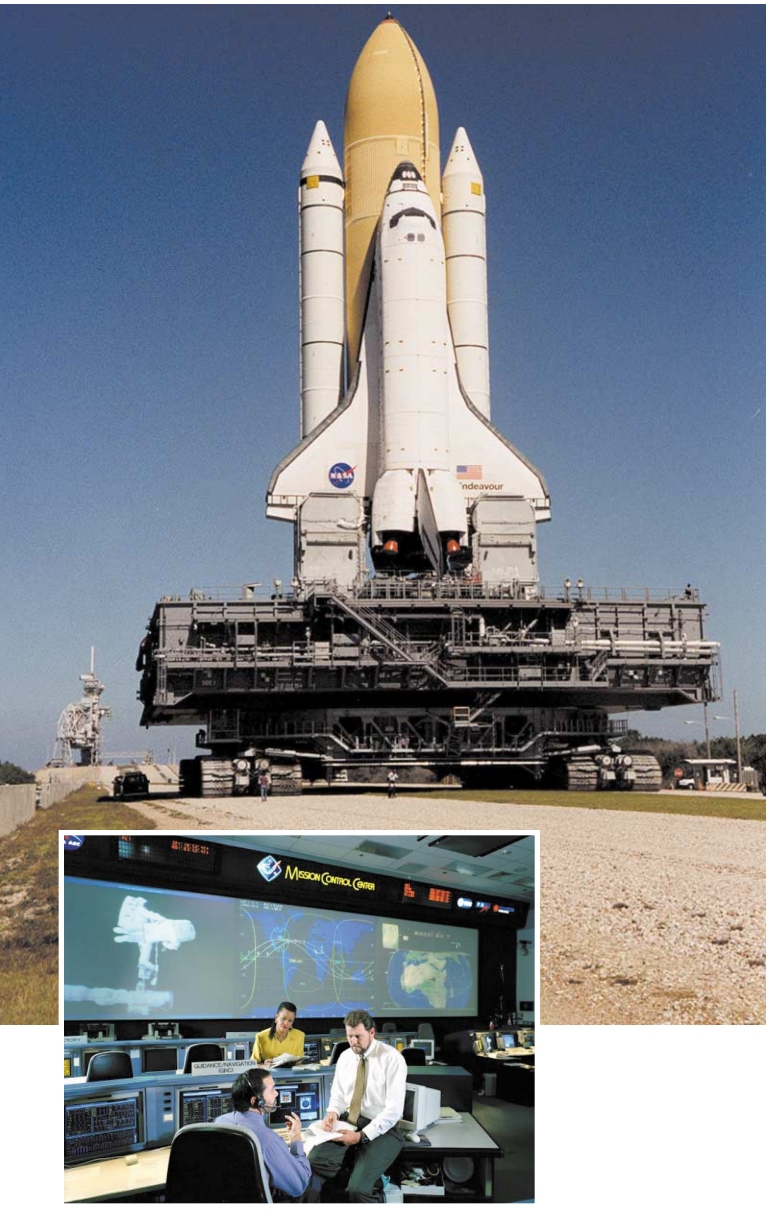


Technology and management improvements have allowed the civil service workforce supporting the shuttle to be reduced by over 50 percent and contractors reduced by more than 40 percent. Simultaneously, the amount of cargo the shuttle can carry has doubled for some flights, and the time to plan, design and train for a shuttle mission has been shortened by a third. The past 10 years have seen the most complex and challenging missions in history – among them four flights to the Hubble Space Telescope, nine flights to the Russian Mir Space Station, and 13 missions for assembly of the International Space Station.

A Smaller Workforce...

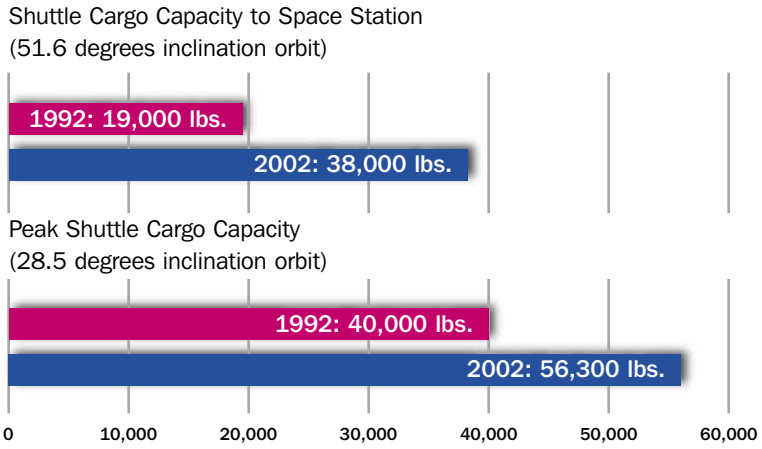
Civil Servants Down 56%; Contractors Down 43%





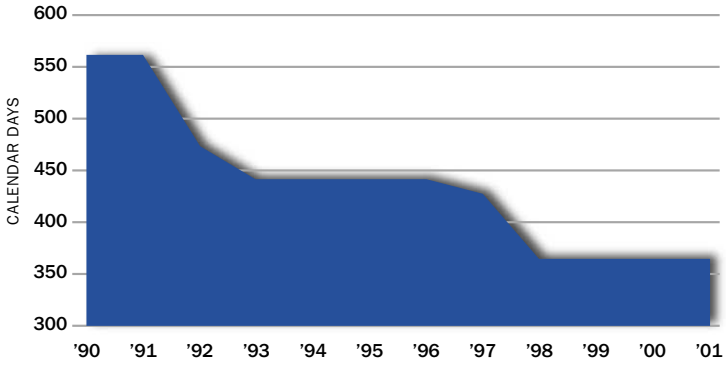
...Launches More Than Ever...

Cargo Capacity Up As Much As 100%



...In Less Time

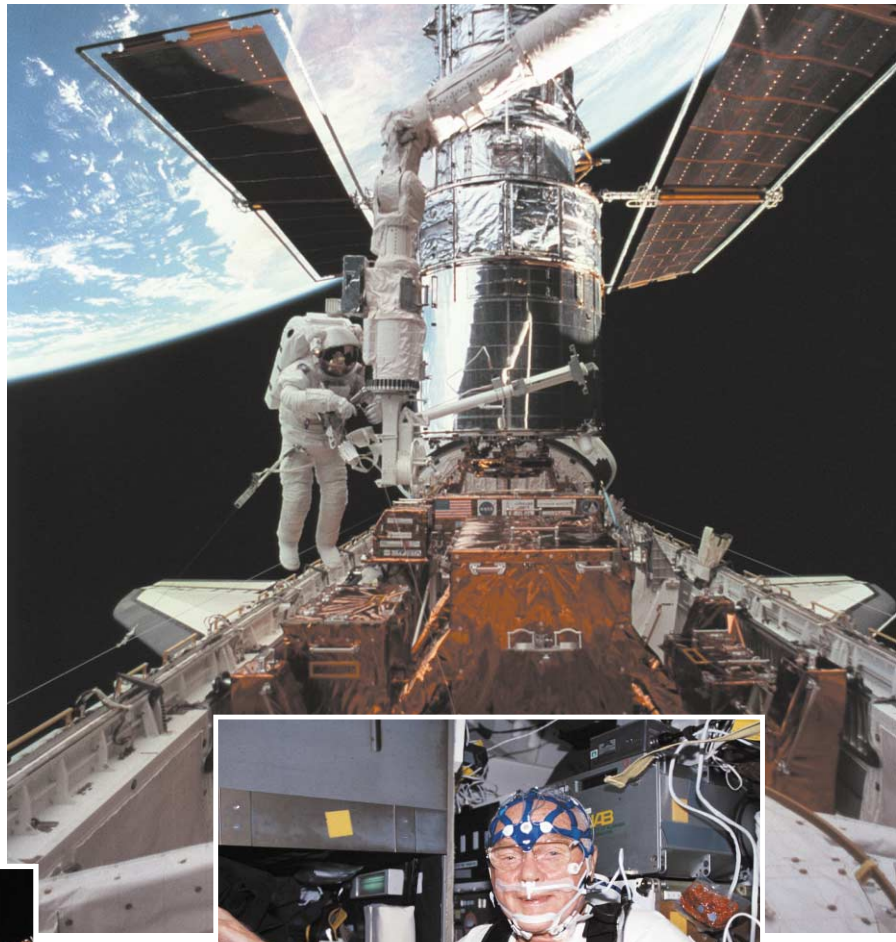
Time to Plan, Design, Prepare a Shuttle Mission

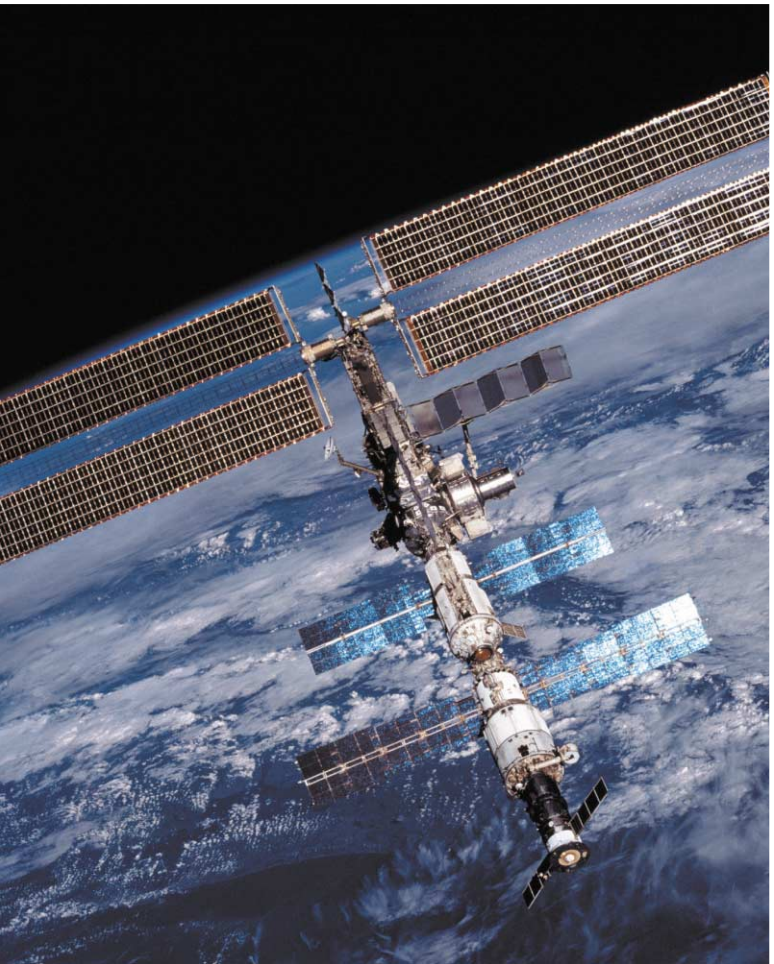


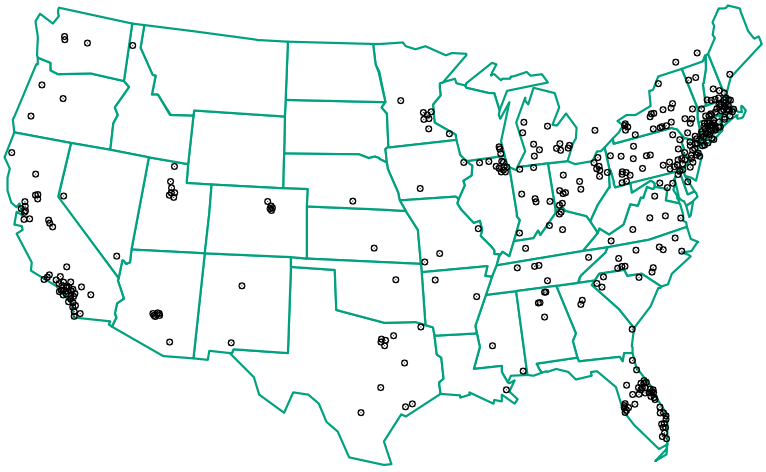
Larger Cargo, Smaller Team

Many Tasks, Single Vehicle

The Space Shuttle's achievements continue, with 60 tons of International Space Station components launched in 2001. The flights completed in 2001 to assemble the space station – critical, interdependent, consecutive missions – were characterized as the most challenging NASA flights since the Moon landings. They were accomplished on schedule with flawless precision. The Space Shuttle has proven its status as the most successful and reliable launch vehicle ever built. In flight for more than 20 years, the shuttle remains the world's only spacecraft capable of satellite deployment, maintenance, repair and retrieval; space station assembly and support; and on-orbit research.







The Pride of America
Each Space Shuttle launch is the product of craftsmanship and products provided by companies in hundreds of cities and towns coast to coast.

Shuttle upgrades will continue to improve some of the highest risk systems, increasing the safety of the main engines, reducing pilots' cockpit workload, improving wheels and tires, and strengthening welds on the external fuel tank. Upgrading the shuttle to increase safety and avoid obsolete technologies ensures that it will continue to be the premier human spacecraft in the world for decades to come. Almost 75 percent of the shuttle fleet's design life remains. With each of the four shuttle orbiters built to fly 100 missions, at the end of 2001, Discovery led the fleet with only 30 flights.

With a quarter of its design life accomplished, the shuttle's record is unrivaled:

- It has launched over 3 million pounds of cargo and more than 650 passengers and pilots, including 50 international astronauts from 12 nations.
- The shuttle fleet has spent a total of more than three years in flight.
- Over 850 shuttle payloads have flown, including hundreds of individual experiments.
- The shuttle has deployed more than 60 payloads and retrieved more than two dozen.
- The shuttle has traveled more than 385 million miles and completed more than 15,000 orbits of Earth.

Today's Upgrades Will Improve High-Risk Areas

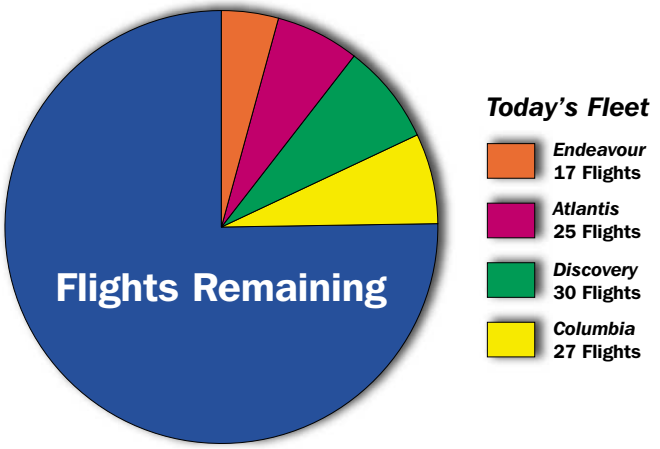
"Smart cockpit" improves emergency awareness

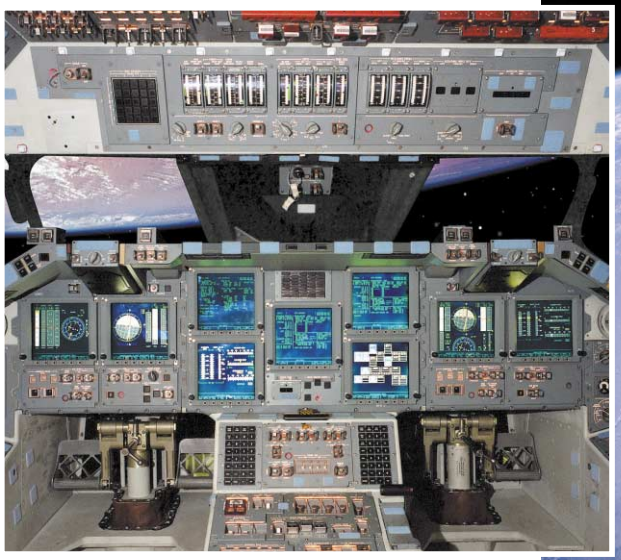
Advanced health system may triple engine safety

Stronger external fuel tank

Better wheels and tires

Orbiter Design Life: 75% Remains





Proven Past, Promising Future

Familiar Sight, Amazing Facts

Although its regular string of successful flights has bred familiarity, the Space Shuttle is the world's most complex machine:

- The Space Shuttle has more than 2.5 million parts, 230 miles of wire, 1,060 plumbing valves and connections, 1,440 circuit breakers, and 27,000 insulating tiles and blankets.
- The shuttle accelerates from zero to about nine times as fast as a bullet, 17,400 mph, in 8.5 minutes.
- The shuttle's two solid rockets consume 10 tons of fuel each second at launch, producing 44 million horsepower.
- Temperatures in the shuttle's main engines reach 6,000 degrees Fahrenheit, which is higher than the boiling point of iron.
- The shuttle encounters temperatures ranging from -250 degrees Fahrenheit in space to 3,000 degrees Fahrenheit during entry.
- The shuttle weighs 4.5 million pounds at launch; 3.5 million pounds are propellants consumed in the next 8.5 minutes.

On The Internet:

spaceflight.nasa.gov/shuttle/seconddecade

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